



REHAB / RECOVERY / PHYSIOTHERAPY

## Rehabilitation of the Sprained Ankle

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The ankle sprain is one of the most common musculoskeletal injuries in both athletes and non-athletes. Such sprains make up about 10% of all injuries treated in emergency rooms and 15% of all sports injuries.<sup>1</sup>

### Classification of Ankle Sprains

The ankle complex consists of three major ligaments: the anterior talofibular (ATF) ligament, the calcaneofibular (CF) ligament and the posterior talofibular (PTF) ligament. Ankle sprains are classified into three categories:

#### Grade I

- *ligament stretch, macroscopic tearing*
- *little swelling or tenderness*
- *no ligamentous laxity*
- *little to no loss of function*

#### Grade II

- *partial tear of the ligament*
- *moderate swelling and pain*
- *mild to moderate ligamentous laxity*
- *moderate loss of function*

#### Grade III

- *complete ligament rupture*
- *severe swelling, pain and hemorrhage*
- *considerable ligamentous laxity*
- *total loss of function*

## Clinical Observations

Stress and x-ray, talar tilt and anterior draw are inconsistent. Many professionals contend that no clinically significant measurement can be obtained from stress views of the ankle to differentiate between a grade I and grade II sprain.<sup>2,3,4</sup> One study surgically explored 43 ankle injuries and found that point tenderness was also an inadequate guide to assessing the degree of tearing.<sup>5</sup>

Magnetic resonance imaging (MRI) studies have demonstrated that many other structures can be injured with chronic ankle sprains, including the ATF and CF ligaments, the peroneus brevis muscle and the peroneal retinaculum.<sup>6</sup> Degenerative joint disease, osteochondritis dissecans, avascular necrosis of the talus and stress fractures of the cuboid may develop over time.

In a study by Frey,<sup>1</sup> 15 patients were examined by an orthopedic surgeon within 48 hours of an acute inversion injury. Using the above criteria, seven patients were diagnosed with a grade III sprain based on clinical findings. Complete rupture of the anterior talofibular ligament was confirmed on MRI.

However, of the eight patients diagnosed as having a grade II sprain based on clinical exam findings alone, only two demonstrated a partial anterior talofibular ligament tear on MRI. One was normal and five were completely ruptured. In this same group, the calcaneofibular ligament was normal in three patients, partially torn in three and ruptured in two. It was also noted that 53% of inversion injuries demonstrated posterior tibial tenosynovitis, possibly due to compression of the medial structures inferior to the medial malleolus. In Frey's study, the grade II injury was accurate only 25% of the time, and associated injuries were often missed completely.

Because patients with grade II and grade III injuries typically respond well to conservative treatment ("PRICE": protection, rest, ice, compression, elevation), an MRI is not recommended in all acute ankle injuries. However, it would certainly be a useful tool for the few patients who do not respond to initial conservative treatments. For competitive athletes, an MRI early on may be indicated to confirm a complete rupture. Such an individual may be required to have immediate surgical repair.

Examine the overall structure of the foot. Excessive pronation and/or supination places increased biomechanical stress on the ligaments. If a pedal imbalance is left unsupported, healing may be delayed.

## Rehabilitative Therapy

Patients with ankle sprains should generally be encouraged to exercise, which helps promote healing and strengthening of affected structures. An exercise program can also lessen the risk and severity of reinjury, an important consideration in light of the chronic nature of ankle instability.<sup>7</sup>

Therapeutic exercise should be introduced when ankle swelling and pain have decreased.

Resistance exercises with elastic/surgical tubing are well-suited for sprain injuries<sup>8</sup> (see Figure 1), as such activities incorporate principles of isokinetic motion, including overflow. The patient can exercise without pain, yet still benefit from the activity because of the 30 degree strength overflow that occurs in the exercise range of motion (ROM).<sup>9</sup>



Figure 1: Surgical tubing for exercise of the ankle.

Until the patient regains active ROM, the health professional should perform passive range of motion activities.<sup>10</sup> Manual exercise should include movement in all planes, emphasizing resistance to eversion and dorsiflexion. This level of manual exercise should not elicit pain. As the patient builds tolerance to the manual resistance, it is appropriate to introduce a formal exercise

program.<sup>11</sup>

Proprioceptive response in ankle ligaments can be diminished by injury, increasing the likelihood of reinjury and chronic instability.<sup>10,11</sup> The patient experiences an incoordination of ligamentous and muscular structures that results in mechanical weakness.<sup>12</sup>

A simple test can demonstrate the extent of mechanoreceptor involvement.<sup>11</sup> With eyes closed, the patient is asked to use one hand to mimic position of the injured foot, palm parallel to the plantar surface. With minimal force, place the ankle in a range of positions. A positive response for mechanoreceptor system injury is noted when the ankle is inverted 10 degree to 15 degree more than the hand.

### Preventing Reinjury

With the chronic nature of some ankle instabilities, it can be difficult to completely eliminate the possibility of reinjury. However, several factors have been identified that significantly reduce the risk of further sprains. The health care professional's goal should be to:

- restore strength and flexibility;<sup>11</sup>
- limit excessive ankle motion;<sup>12</sup>
- correct biomechanical deficits.<sup>10</sup>

While some sources recommend ankle taping or use of other support devices, the long-term value is debatable. While taping may prevent inversion injury through mechanical intervention, it can lead to weakening and atrophy of support structures.<sup>12</sup> Custom-made, flexible orthotics offer a valid approach to long-term motion control and biomechanical correction.<sup>13,14</sup>

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